Physiological Performance Of Different Rice Hybrids Under Agroclimatic Conditions Of U.P.

ABSTRACT

A field experiment was conducted at the Crop Research Farm, Department of Agronomy, during kharif season 2021 at Samhigginbottom University of Agricultural Technology And Sciences, Prayagraj (U.P.) to study the performance of ten rice hybrids namely UR-26, UR-27, UR-28, UR-29, UR-30, UR-31, UR-32, UR-33, UR-34, and UR-35 under the agro-climatic conditions of U.P. in terms of growth, productivity and grain quality during kharif season. Observations on growth and yield revealed that UR-32 recorded higher plant height (120.37 cm), dry weight (53.33 g/plant), Crop growth rate (40.08 $g/m^2/day$), relative growth rate (0.024 g/g/day), and yield (28.14 q/ha) compared to other hybrid rice cultivars Besides yield and yield attributing characters, grain quality (hulling, milling and head rice recovery) was also better in UR-32. , UR-26 achieved lower grain yield (18.48 q/ha) and other yield attributing characters. Considering all the observations it can be concluded that UR-32 performed better in agro-climatic conditions of U.P.

Keywords: ***Hybrid Rice, varietal response, growth parameters, and yield attributes.***

INTRODUCTION

Cereals come from grasses that are part of the Gramineae family and are grown for their edible qualities. Rice is a major food grain crop that is grown in South East Asian countries and produces 683 million tones. India has a 21.6% share in the world's rice product, while China has the first position.. Rice accounts for around 43% of total food grains and 46% of total cereal products in India. Rice is the primary source of food energy, with Asia accounting for more than 90 per cent of the world's production and consumption. It is an essential part of Indian culture and tradition, and contributes to 15 per cent of the country's GDP. Additionally, rice provides 43 per cent of the calorie demand for more than 70 per cent of India's population, and accounts for 40 per cent of its food production supply. In India, the highest area under cultivation is reported from Madhya Pradesh at 3.50 lakh hectares, with Telangana at 3.49 lakh hectares. The second estimate of rice production for the GOI 2019 is 115.60

million tons. Additionally, rice meets 43% of the caloric requirements of over 70% of the population in India, and 40% of the food product supply in the country. The Indian state of Madhya Pradesh accounts for the largest area under cultivation, with 3.50% of the total area under cultivation, while Telangana, with 3.49% of the area under cultivation. The GOI's second estimate for rice production for 2019 stands at 115.60 m tons

MATERIALS AND METHODS

During the 2021 kharif season, a field trial was conducted at Crop Research Farm, Department of Agriculture, SamHigginbittom University of Agricultural Technology and Sciences. The location of the experiment was between 25°N latitude, 72.5°E latitude. The climate was characterized by an alternating hot rainy season from late June to the beginning of September, with average temperatures ranging from 38°C to 50°C.The soil was composed of sandy loam with a pH of 7.2, EC of 0.14 dSm^{-1}, organic carbon of 0.38%, available N of 225 kg, P of 19.5 kg ha^{-1} , K of 340 kg, S of 16.8 ppm, and Zn of 0.51 ppm. The trial was conducted in a Randomized Block Design (RBD), with 10 treatments and three replications. The treatment was made up of Hybrids (T1 = 26, T2 = 27, T3 = 28, T4 = 29, T5 = 30, T6 = 31, T7 = 32, T8 = 33, T9 = 34, T10 = 35). The seedlings of 20 days old were transplanted into the main field at an average spacing of 20x10cm. The recommended fertilizer dose was 120:60:60 kg $N_1P_2O_5$,K_2O Kg ha^{-1}). We used 100% full dose of phosphorus and potassium, while 50% of nitrogen was applied at planting as a basal dose. The remaining nitrogen was spread out in two equal amounts as top dressing during the active (tillering and panicle initiation) stage. We also used 25 kg of zinc and 25 kg of sulphur as a basal dose to correct zinc and sulphur deficiencies. Irrigation was done at a 10-12 day interval to avoid flooding, but other normal cultural practices like weeding at 30 DAT and 45 DAT were also followed. Each plot had one quadrate of 1 m^2 harvested, and the results and data were analysed separately using analysis of variation. The difference between treatment means was compared using a least significant difference test with a 5% probability level.

RESULT AND DISCUSSION

PLANT HEIGHT (cm)

Plant height is not directly related to yield, especially for grain crops, but it does show how important nutrients are for the plant's metabolism. The highest plant height was measured as 118.29 cm in T 5 (UR 30), followed by 117.81 cm in T6 (UR 31) and the lowest was 104.52 cm in T1 (UR 26) (90 DAT). The increased height could be because of the genetic makeup of the plant. It could also be because the plant is first generation hybrid, which means it has more vigor. The increase in plant height could also be because of the same amount of nutrients being available to the crop, especially nitrogen, for a longer time during its growth. Deshpande et al. 2011, Haque et al., 2015.

PLANT DRY WEIGHT (g/hill)

The maximum plant dry weight was observed as 52.43g in T10 (UR 35) and the minimum plant dry weight was recorded as

48.43 g in T 9 (UR 34) as the 90 DAT level. The increased plant dry weight in various hybrids may be attributed to a higher assimilatory surface, resulting in increased dry matter production, and efficient translocation and dissemination of photosynthates. The accumulation of dry matter is dependent on the photosynthesis and respiratory rate during vegetative growth.

CROP GROWTH RAT (g/m^2/day) AND RELATIVE GROWTH RATE (g g^{-1} day^{-1})

Crop growth rates (g m^{-2}-day^{-1}) of hybrid rice were found to be non-significant between treatments at different intervals (0-15), (15-30), (30-45), (45-60), (60-75), and (75-90) DAT. Similarly, Relative growth rates (g g^{-1} day^{-1}) of hybrids (0-15, (15-30), (30-45), (45-60), (60-75) and (75-90) DAT were found to show non-significant differences between treatments. However, the largest percentage decrease in CGR and RGR were observed in T8 (UR 33) and T2 (UR 27), with a minimum CGR of 35.67 in T9 (UR 34) and a minimum RGR of 0.021 in T6 (UR 31). The prevalence of low temperature and low humidity during the growth and reproductive stages of hybrid rice, particularly during the flag leaf stage, may be a contributing factor to the non-significant difference between treatments. Similar findings can be seen in Yadav et al. (2004).

GRAIN YIELD/HILL

Treatments T7 (UR 32) had the highest grain yield per hill at 28.14g, followed by T10 (UR35) and T3 (UR 28) at 27.10g and 26.42g respectively, while Treatment T1 had the lowest grain yield (18.48g) at UR 26. Hybrid rice accumulates more dry matter during the early and mid-growth stages, resulting in more spikelet's per panicle. As a result, hybrids (UR 32) have larger panicles with more spikelet's panicles^{-1}. These factors result in yields typically 15% or more higher than ordinary rice.

GRAIN YIELD (t/ha)

The highest grain yield was observed at 6.34 tonnes per hectare (ha^{-1}) in Treatment T 7 (UR 32), followed by a yield of 6.14 tonnes per hectare in Treatment T4 (UR 29), and the lowest grain yield (4.25 tonnes per hectare) was reported in Treatment T5 (UR 30).

CONCLUSION

The study revealed that UR-32 performed better under the agro-climatic conditions of U.P. when comparing the growth parameters, yield attributes, yield, and grain quality of these hybrid rice types.

Table 1 : Evaluating the physiological parameters of different rice hybrids

	90 DAT		60-75 DAT		90 DAT	
Hybrids	Plant height (cm)	Dry weight (g/hill)	CGR	RGR	Yield/hill	Yield (t ha^{-1})
UR-26	104.52	50.21	38.46	0.022	18.48	5.43
UR-27	110.34	51.63	40.34	0.025	23.22	5.51
UR-28	113.78	49.36	40.48	0.023	26.42	5.49
UR-29	105.21	50.76	37.72	0.022	20.38	6.14
UR-30	118.29	52.74	40.56	0.023	23.45	4.25
UR-31	117.84	49.21	37.32	0.021	21.83	5.45
UR-32	120.37	53.33	40.08	0.024	28.14	6.34
UR-33	116.6	48.43	35.95	0.022	23.18	5.65
UR-34	116.63	46.91	35.67	0.024	23.47	5.56
UR-35	107.58	52.43	37.91	0.024	27.1	5.25
F-test	S	S	NS	NS	S	S
SEm±	1.05	1.02	1.01	0.001	0.89	0.12
CD (P=0.05)	3.01	2.54	-	-	2.67	0.48

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Deshpande et al. 2011 stated that The increase in plant height could also be because of the same amount of nutrients being available to the crop, especially nitrogen, for a longer time during its growth.

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